SEQUENCE LISTING

<110> Wang, Liaoteng
Wickens, Marvin P.
Kimble, Judith E.

<120> Regulatory poly(A) polymerase and uses thereof

<130> 960296.99314

<140> 10/665,797
<141> 2003-09-18

<150> 60/411,685
<151> 2003-09-18

<160> 12

<170> PatentIn version 3.2

<210> 1
<211> 345
<212> PRT
<213> Homo sapiens

<400> 1

Tyr Gly Ile Thr Ser Pro Ile Ser Leu Ala Ser Pro Glu Glu Ile Asp
1 5 10 15

His Ile Tyr Thr Gln Lys Leu Ile Asp Ala Met Lys Pro Phe Gly Val
20 25 30

Phe Glu Asp Glu Glu Glu Leu Asn His Arg Leu Val Val Leu Gly Lys
35 40 45

Leu Asn Asn Leu Val Lys Glu Trp Ile Ser Asp Val Ser Glu Ser Lys
50 55 60

Asn Leu Pro Pro Ser Val Val Ala Thr Val Gly Gly Lys Ile Phe Thr
65 70 75 80

Phe Gly Ser Tyr Arg Leu Gly Val His Thr Lys Gly Ala Asp Ile Asp
85 90 95

Ala Leu Cys Val Ala Pro Arg His Val Glu Arg Ser Asp Phe Phe Gln
100 105 110

Ser Phe Phe Glu Lys Leu Lys His Gln Asp Gly Ile Arg Asn Leu Arg
115 120 125

Ala Val Glu Asp Ala Phe Val Pro Val Ile Lys Phe Glu Phe Asp Gly
130 135 140

```
Ile Glu Ile Asp Leu Val Phe Ala Arg Leu Ala Ile Gln Thr Ile Ser
145                 150                 155                 160

Asp Asn Leu Asp Leu Arg Asp Asp Ser Arg Leu Arg Ser Leu Asp Ile
                165                 170                 175

Arg Cys Ile Arg Ser Leu Asn Gly Cys Arg Val Thr Asp Glu Ile Leu
            180                 185                 190

His Leu Val Pro Asn Lys Glu Thr Phe Arg Leu Thr Leu Arg Ala Val
        195                 200                 205

Lys Leu Trp Ala Lys Arg Arg Gly Ile Tyr Ser Asn Met Leu Gly Phe
    210                 215                 220

Leu Gly Gly Val Ser Trp Ala Met Leu Val Ala Arg Thr Cys Gln Leu
225                 230                 235                 240

Tyr Pro Asn Ala Ala Ala Ser Thr Leu Val His Lys Phe Phe Leu Val
                245                 250                 255

Phe Ser Lys Trp Glu Trp Pro Asn Pro Val Leu Leu Lys Gln Ser Glu
            260                 265                 270

Glu Ser Asn Leu Asn Leu Pro Val Trp Asp Pro Arg Val Asn Pro Ser
        275                 280                 285

Asp Arg Tyr His Leu Met Pro Ile Ile Thr Pro Ala Tyr Pro Gln Gln
    290                 295                 300

Asn Ser Thr Tyr Asn Val Ser Thr Ser Thr Arg Thr Val Met Val Glu
305                 310                 315                 320

Glu Phe Lys Gln Gly Leu Ala Val Thr Asp Glu Ile Leu Gln Gly Lys
                325                 330                 335

Ser Asp Trp Ser Lys Leu Leu Glu Pro
            340                 345
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<210> 2
<211> 345
<212> PRT
<213> Drosophila melanogaster

<400> 2

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Leu Gly Met Thr Ser Ala Ile Ser Leu Ala Glu Pro Arg Pro Glu Asp
1               5                  10                  15

Leu Gln Arg Thr Asp Glu Leu Arg Gly Ser Leu Glu Pro Tyr Asn Val
            20                  25                  30

Phe Glu Ser Gln Asp Glu Leu Asn His Arg Met Glu Ile Leu Ala Lys
        35                  40                  45

Leu Asn Thr Leu Val Lys Gln Trp Val Lys Glu Ile Ser Val Ser Lys
    50                  55                  60

Asn Met Pro Glu Ser Ala Ala Glu Lys Leu Gly Gly Lys Ile Tyr Thr
65                  70                  75                  80

Phe Gly Ser Tyr Arg Leu Gly Val His His Lys Gly Ala Asp Ile Asp
                85                  90                  95

Ala Leu Cys Val Ala Pro Arg Asn Ile Glu Arg Thr Asp Tyr Phe Gln
            100                 105                 110

Ser Phe Phe Glu Val Leu Lys Lys Gln Pro Glu Val Thr Glu Cys Arg
        115                 120                 125

Ser Val Glu Glu Ala Phe Val Pro Val Ile Lys Met Asn Phe Asp Gly
    130                 135                 140

Ile Glu Ile Asp Leu Leu Phe Ala Arg Leu Ser Leu Lys Glu Ile Pro
145                 150                 155                 160

Asp Asp Phe Asp Leu Arg Asp Asp Asn Leu Leu Arg Asn Leu Asp His
                165                 170                 175

Arg Ser Val Arg Ser Leu Asn Gly Cys Arg Val Thr Asp Glu Ile Leu
            180                 185                 190

Ala Leu Val Pro Asn Ile Glu Asn Phe Arg Leu Ala Leu Arg Thr Ile
        195                 200                 205

Lys Leu Trp Ala Lys Lys His Gly Ile Tyr Ser Asn Ser Leu Gly Tyr
    210                 215                 220

Phe Gly Gly Val Thr Trp Ala Met Leu Val Ala Arg Thr Cys Gln Leu
225                 230                 235                 240
```

Tyr Pro Asn Ala Ala Ala Ala Thr Leu Val His Lys Phe Phe Leu Val
245 250 255

Phe Ser Arg Trp Lys Trp Pro Asn Pro Val Leu Leu Lys His Pro Asp
260 265 270

Asn Val Asn Leu Arg Phe Gln Val Trp Asp Pro Arg Val Asn Ala Ser
275 280 285

Asp Arg Tyr His Leu Met Pro Ile Ile Thr Pro Ala Tyr Pro Gln Gln
290 295 300

Asn Ser Thr Phe Asn Val Ser Glu Ser Thr Lys Lys Val Ile Leu Thr
305 310 315 320

Glu Phe Asn Arg Gly Met Asn Ile Thr Asp Glu Ile Met Leu Gly Arg
325 330 335

Ile Pro Trp Glu Arg Leu Phe Glu Ala
340 345

<210> 3
<211> 345
<212> PRT
<213> Saccharomyces cerevisiae

<400> 3

Phe Gly Ile Thr Gly Pro Val Ser Thr Val Gly Ala Thr Ala Ala Glu
1 5 10 15

Asn Lys Leu Asn Asp Ser Leu Ile Gln Glu Leu Lys Lys Glu Gly Ser
20 25 30

Phe Glu Thr Glu Gln Glu Thr Ala Asn Arg Val Gln Val Leu Lys Ile
35 40 45

Leu Gln Glu Leu Ala Gln Arg Phe Val Tyr Glu Val Ser Lys Lys Lys
50 55 60

Asn Met Ser Asp Gly Met Ala Arg Asp Ala Gly Gly Lys Ile Phe Thr
65 70 75 80

Tyr Gly Ser Tyr Arg Leu Gly Val His Gly Pro Gly Ser Asp Ile Asp
85 90 95

Thr Leu Val Val Val Pro Lys His Val Thr Arg Glu Asp Phe Phe Thr
100 105 110

```
Val Phe Asp Ser Leu Leu Arg Glu Arg Lys Glu Leu Asp Glu Ile Ala
        115                 120                 125

Pro Val Pro Asp Ala Phe Val Pro Ile Ile Lys Ile Lys Phe Ser Gly
    130                 135                 140

Ile Ser Ile Asp Leu Ile Cys Ala Arg Leu Asp Gln Pro Gln Val Pro
145                 150                 155                 160

Leu Ser Leu Thr Leu Ser Asp Lys Asn Leu Leu Arg Asn Leu Asp Glu
                165                 170                 175

Lys Asp Leu Arg Ala Leu Asn Gly Thr Arg Val Thr Asp Glu Ile Leu
            180                 185                 190

Glu Leu Val Pro Lys Pro Asn Val Phe Arg Ile Ala Leu Arg Ala Ile
        195                 200                 205

Lys Leu Trp Ala Gln Arg Arg Ala Val Tyr Ala Asn Ile Phe Gly Phe
    210                 215                 220

Pro Gly Gly Val Ala Trp Ala Met Leu Val Ala Arg Ile Cys Gln Leu
225                 230                 235                 240

Tyr Pro Asn Ala Cys Ser Ala Val Ile Leu Asn Arg Phe Phe Ile Ile
                245                 250                 255

Leu Ser Glu Trp Asn Trp Pro Gln Pro Val Ile Leu Lys Pro Ile Glu
            260                 265                 270

Asp Gly Pro Leu Gln Val Arg Val Trp Asn Pro Lys Ile Tyr Ala Gln
        275                 280                 285

Asp Arg Ser His Arg Met Pro Val Ile Thr Pro Ala Tyr Pro Ser Met
    290                 295                 300

Cys Ala Thr His Asn Ile Thr Glu Ser Thr Lys Lys Val Ile Leu Gln
305                 310                 315                 320

Glu Phe Val Arg Gly Val Gln Ile Thr Asn Asp Ile Phe Ser Asn Lys
                325                 330                 335

Lys Ser Trp Ala Asn Leu Phe Glu Lys
            340                 345
```

<210> 4
<211> 349
<212> PRT
<213> Caenorhabditis elegans

<400> 4

Leu Gly Val Ser Gln Pro Ile Ser Leu Ala His Pro Asp Ser Lys Asp
1 5 10 15

Ile Ala Gln Thr Thr Leu Leu Ile Glu Thr Leu Lys Lys Phe Gly Ser
20 25 30

Tyr Glu Pro Lys Glu Glu Thr Glu Gln Arg Met Glu Val Leu Arg Asn
35 40 45

Leu Asn Arg Leu Val Lys Glu Trp Val Lys Asn Val Thr Ala Met Lys
50 55 60

Ile Pro Asn Gly Glu Gly Val Asn Ala Gly Gly Lys Leu Phe Thr Phe
65 70 75 80

Gly Ser Tyr Arg Leu Gly Val His Ser Ser Gly Ala Asp Ile Asp Thr
85 90 95

Leu Ala Val Val Pro Arg His Ile Asp Arg Ser Asp Phe Phe Thr Ser
100 105 110

Phe Lys Glu Met Leu Asn Asn Asp Pro Asn Val Thr Glu Leu His Gly
115 120 125

Val Glu Glu Ala Phe Val Pro Val Met Lys Leu Lys Tyr Ser Gly Val
130 135 140

Glu Leu Asp Ile Leu Phe Ala Arg Leu Ala Leu Lys Glu Val Pro Asp
145 150 155 160

Thr Gln Glu Leu Ser Asp Asp Asn Leu Leu Arg Asn Leu Asp Gln Glu
165 170 175

Ser Val Arg Ser Leu Asn Gly Cys Arg Val Ala Glu Gln Leu Leu Lys
180 185 190

Leu Val Pro Arg Gln Lys Glu Phe Cys Val Thr Leu Arg Ala Ile Lys
195 200 205

```
Leu Trp Ala Lys Asn His Gly Ile Tyr Ser Asn Ser Met Gly Phe Phe
    210                 215                 220

Gly Gly Ile Thr Trp Ala Ile Leu Val Ala Arg Ala Cys Gln Leu Tyr
225                 230                 235                 240

Pro Asn Ala Ser Pro Ser Arg Leu Val His Arg Met Phe Phe Ile Phe
                245                 250                 255

Ser Thr Trp Thr Trp Pro His Pro Val Val Leu Asn Glu Met Asn Asn
            260                 265                 270

Asp Arg Asn Asp Ile Pro Thr Leu Cys Glu Leu Val Trp Asp Pro Arg
        275                 280                 285

Arg Lys Asn Thr Asp Arg Phe His Val Met Pro Ile Ile Thr Pro Ala
    290                 295                 300

Phe Pro Glu Gln Asn Ser Thr His Asn Val Thr Arg Ser Thr Ala Thr
305                 310                 315                 320

Val Ile Lys Asn Glu Ile Cys Glu Ala Leu Glu Ile Cys Arg Asp Ile
                325                 330                 335

Ser Glu Gly Lys Ser Lys Trp Thr Ala Leu Phe Glu Glu
            340                 345
```

<210> 5
<211> 388
<212> PRT
<213> Caenorhabditis elegans

<400> 5

```
Arg Gly Phe Ala Ser Pro Ser Pro Pro Thr Ser Leu Leu Ser Glu Pro
1               5                   10                  15

Leu Ser Arg Met Asp Val Leu Ser Glu Lys Ile Trp Asp Tyr His Asn
            20                  25                  30

Lys Val Ser Gln Thr Asp Glu Met Leu Gln Arg Lys Leu His Leu Arg
        35                  40                  45

Asp Met Leu Tyr Thr Ala Ile Ser Pro Val Phe Pro Leu Ser Gly Leu
    50                  55                  60

Tyr Val Val Gly Ser Ser Leu Asn Gly Phe Gly Asn Asn Ser Ser Asp
65                  70                  75                  80
```

```
Met Asp Leu Cys Leu Met Ile Thr Asn Lys Asp Leu Asp Gln Lys Asn
                85                  90                  95

Asp Ala Val Val Val Leu Asn Leu Ile Leu Ser Thr Leu Gln Tyr Glu
            100                 105                 110

Lys Phe Val Glu Ser Gln Lys Leu Ile Leu Ala Lys Val Pro Ile Leu
        115                 120                 125

Arg Ile Asn Phe Ala Ala Pro Phe Asp Asp Ile Thr Val Asp Leu Asn
    130                 135                 140

Ala Asn Asn Ser Val Ala Ile Arg Asn Thr His Leu Leu Cys Tyr Tyr
145                 150                 155                 160

Ser Ser Tyr Asp Trp Arg Val Arg Pro Leu Val Ser Val Val Lys Glu
                165                 170                 175

Trp Ala Lys Arg Lys Gly Ile Asn Asp Ala Asn Lys Ser Ser Phe Thr
            180                 185                 190

Ser Tyr Ser Leu Val Leu Met Val Ile His Phe Leu Gln Cys Gly Pro
        195                 200                 205

Thr Lys Val Leu Pro Asn Leu Gln Gln Ser Tyr Pro Asn Arg Phe Ser
    210                 215                 220

Asn Lys Val Asp Val Arg Thr Leu Asn Val Thr Met Ala Leu Glu Glu
225                 230                 235                 240

Val Ala Asp Asp Ile Asp Gln Ser Leu Ser Glu Lys Thr Thr Leu Gly
                245                 250                 255

Glu Leu Leu Ile Gly Phe Leu Asp Tyr Tyr Ala Asn Glu Phe Asn Tyr
            260                 265                 270

Asp Arg Asp Ala Ile Ser Ile Arg Gln Gly Arg Arg Val Glu Arg Ala
        275                 280                 285

Ala Leu Ala Val Arg Pro Lys Ile His Ser Asn Ser Glu Gly Asp Lys
    290                 295                 300

Glu Thr Pro Pro Pro Ser Ser Ser Ala Ser Thr Ser Ser Ile His Asn
305                 310                 315                 320
```

```
Gly Gly Thr Pro Gly Ile Pro Met His His Ser Ile Ser Asn Pro His
                325                 330                 335

Phe Trp Arg Ser Gln Trp Arg Cys Val Cys Ile Glu Glu Pro Phe Thr
            340                 345                 350

Asn Ser Asn Thr Ala His Ser Ile Tyr Asp Glu Met Val Phe Glu Ala
        355                 360                 365

Ile Lys Lys Ala Phe Arg Glu Ala His Gly Glu Leu Gln His Asn His
    370                 375                 380

Asp Leu Asp Lys
385
```

<210> 6
<211> 387
<212> PRT
<213> Caenorhabditis elegans

<400> 6

```
Gly Phe Ala Ser Pro Ser Pro Pro Thr Ser Leu Leu Ser Glu Pro Leu
1               5                   10                  15

Ser Arg Met Asp Val Leu Ser Glu Lys Ile Trp Asp Tyr His Asn Lys
            20                  25                  30

Val Ser Gln Thr Asp Glu Met Leu Gln Arg Lys Leu His Leu Arg Asp
        35                  40                  45

Met Leu Tyr Thr Ala Ile Ser Pro Val Phe Pro Leu Ser Gly Leu Tyr
    50                  55                  60

Val Val Gly Ser Ser Leu Asn Gly Phe Gly Asn Asn Ser Ser Asp Met
65                  70                  75                  80

Asp Leu Cys Leu Met Ile Thr Asn Lys Asp Leu Asp Gln Lys Asn Asp
                85                  90                  95

Ala Val Val Val Leu Asn Leu Ile Leu Ser Thr Leu Gln Tyr Glu Lys
            100                 105                 110

Phe Val Glu Ser Gln Lys Leu Ile Leu Ala Lys Val Pro Ile Leu Arg
        115                 120                 125
```

```
Ile Asn Phe Ala Ala Pro Phe Asp Asp Ile Thr Val Asp Leu Asn Ala
    130                 135                 140

Asn Asn Ser Val Ala Ile Arg Asn Thr His Leu Leu Cys Tyr Tyr Ser
145                 150                 155                 160

Ser Tyr Asp Trp Arg Val Arg Pro Leu Val Ser Val Val Lys Glu Trp
                165                 170                 175

Ala Lys Arg Lys Gly Ile Asn Asp Ala Asn Lys Ser Ser Phe Thr Ser
            180                 185                 190

Tyr Ser Leu Val Leu Met Val Ile His Phe Leu Gln Cys Gly Pro Thr
        195                 200                 205

Lys Val Leu Pro Asn Leu Gln Gln Ser Tyr Pro Asn Arg Phe Ser Asn
    210                 215                 220

Lys Val Asp Val Arg Thr Leu Asn Val Thr Met Ala Leu Glu Glu Val
225                 230                 235                 240

Ala Asp Asp Ile Asp Gln Ser Leu Ser Glu Lys Thr Thr Leu Gly Glu
                245                 250                 255

Leu Leu Ile Gly Phe Leu Asp Tyr Tyr Ala Asn Glu Phe Asn Tyr Asp
            260                 265                 270

Arg Asp Ala Ile Ser Ile Arg Gln Gly Arg Arg Val Glu Arg Ala Ala
        275                 280                 285

Leu Ala Val Arg Pro Lys Ile His Ser Asn Ser Glu Gly Asp Lys Glu
    290                 295                 300

Thr Pro Pro Pro Ser Ser Ser Ala Ser Thr Ser Ser Ile His Asn Gly
305                 310                 315                 320

Gly Thr Pro Gly Ile Pro Met His His Ser Ile Ser Asn Pro His Phe
                325                 330                 335

Trp Arg Ser Gln Trp Arg Cys Val Cys Ile Glu Glu Pro Phe Thr Asn
            340                 345                 350

Ser Asn Thr Ala His Ser Ile Tyr Asp Glu Met Val Phe Glu Ala Ile
        355                 360                 365
```

Lys Lys Ala Phe Arg Glu Ala His Gly Glu Leu Gln His Asn His Asp
370 375 380

Leu Asp Lys
385

<210> 7
<211> 336
<212> PRT
<213> Mus musculus

<400> 7

Glu Ile Pro Leu Leu Glu Pro Arg Glu Ile Thr Leu Pro Glu Ala Lys
1 5 10 15

Asp Lys Leu Ser Gln Gln Ile Leu Glu Leu Phe Glu Thr Cys Gln Gln
20 25 30

Gln Ala Ser Asp Leu Lys Lys Lys Glu Leu Cys Arg Ala Gln Leu Gln
35 40 45

Arg Glu Ile Gln Leu Leu Phe Pro Gln Ser Arg Leu Phe Leu Val Gly
50 55 60

Ser Ser Leu Asn Gly Phe Gly Ala Arg Ser Ser Asp Gly Asp Leu Cys
65 70 75 80

Leu Val Val Lys Glu Glu Pro Cys Phe Phe Gln Val Asn Gln Lys Thr
85 90 95

Glu Ala Arg His Ile Leu Thr Leu Val His Lys His Phe Cys Thr Arg
100 105 110

Leu Ser Gly Tyr Ile Glu Arg Pro Gln Leu Ile Arg Ala Lys Val Pro
115 120 125

Ile Val Lys Phe Arg Asp Lys Val Ser Cys Val Glu Phe Asp Leu Asn
130 135 140

Val Asn Asn Thr Val Gly Ile Arg Asn Thr Phe Leu Leu Arg Thr Tyr
145 150 155 160

Ala Tyr Leu Glu Asn Arg Val Arg Pro Leu Val Leu Val Ile Lys Lys
165 170 175

Trp Ala Ser His His Asp Ile Asn Asp Ala Ser Arg Gly Thr Leu Ser
180 185 190

```
Ser Tyr Ser Leu Val Leu Met Val Leu His Tyr Leu Gln Thr Leu Pro
        195                 200                 205

Glu Pro Ile Leu Pro Ser Leu Gln Lys Ile Tyr Pro Glu Ser Phe Ser
    210                 215                 220

Thr Ser Val Gln Leu His Leu Val His His Ala Pro Cys Asn Val Pro
225                 230                 235                 240

Pro Tyr Leu Ser Lys Asn Glu Ser Ser Leu Gly Asp Leu Leu Leu Gly
                245                 250                 255

Phe Leu Lys Tyr Tyr Ala Thr Glu Phe Asp Trp Asn Thr Gln Met Ile
            260                 265                 270

Ser Val Arg Glu Ala Lys Ala Ile Pro Arg Pro Asp Asp Met Glu Trp
        275                 280                 285

Arg Asn Lys Tyr Ile Cys Val Glu Glu Pro Phe Asp Gly Thr Asn Thr
    290                 295                 300

Ala Arg Ala Val His Glu Lys Gln Lys Phe Asp Met Ile Lys Asp Gln
305                 310                 315                 320

Phe Leu Lys Ser Trp Gln Arg Leu Lys Asn Lys Arg Asp Leu Asn Ser
                325                 330                 335
```

<210> 8
<211> 336
<212> PRT
<213> Homo sapiens

<400> 8

```
Glu Ile Ala Phe Leu Glu Pro Arg Glu Ile Thr Leu Pro Glu Ala Lys
1               5                   10                  15

Asp Lys Leu Ser Gln Gln Ile Leu Glu Leu Phe Glu Thr Cys Gln Gln
            20                  25                  30

Gln Ile Ser Asp Leu Lys Lys Lys Glu Leu Cys Arg Thr Gln Leu Gln
        35                  40                  45

Arg Glu Ile Gln Leu Leu Phe Pro Gln Ser Arg Leu Phe Leu Val Gly
    50                  55                  60
```

```
Ser Ser Leu Asn Gly Phe Gly Thr Arg Ser Ser Asp Gly Asp Leu Cys
65                  70                  75                  80

Leu Val Val Lys Glu Glu Pro Cys Phe Phe Gln Val Asn Gln Lys Thr
                85                  90                  95

Glu Ala Arg His Ile Leu Thr Leu Val His Lys His Phe Cys Thr Arg
            100                 105                 110

Leu Ser Gly Tyr Ile Glu Arg Pro Gln Leu Ile Arg Ala Lys Val Pro
        115                 120                 125

Ile Val Lys Phe Arg Asp Lys Val Ser Cys Val Glu Phe Asp Leu Asn
    130                 135                 140

Val Asn Asn Ile Val Gly Ile Arg Asn Thr Phe Leu Leu Arg Thr Tyr
145                 150                 155                 160

Ala Tyr Leu Glu Asn Arg Val Arg Pro Leu Val Leu Val Ile Lys Lys
                165                 170                 175

Trp Ala Ser His His Gln Ile Asn Asp Ala Ser Arg Gly Thr Leu Ser
            180                 185                 190

Ser Tyr Ser Leu Val Leu Met Val Leu His Tyr Leu Gln Thr Leu Pro
        195                 200                 205

Glu Pro Ile Leu Pro Ser Leu Gln Lys Ile Tyr Pro Glu Ser Phe Ser
    210                 215                 220

Pro Ala Ile Gln Leu His Leu Val His Gln Ala Pro Cys Asn Val Pro
225                 230                 235                 240

Pro Tyr Leu Ser Lys Asn Glu Ser Asn Leu Gly Asp Leu Leu Leu Gly
                245                 250                 255

Phe Leu Lys Tyr Tyr Ala Thr Glu Phe Asp Trp Asn Ser Gln Met Ile
            260                 265                 270

Ser Val Arg Glu Ala Lys Ala Ile Pro Arg Pro Asp Gly Ile Glu Trp
        275                 280                 285

Arg Asn Lys Tyr Ile Cys Val Glu Glu Pro Phe Asp Gly Thr Asn Thr
    290                 295                 300
```

```
Ala Arg Ala Val His Glu Lys Gln Lys Phe Asp Met Ile Lys Asp Gln
305                 310                 315                 320

Phe Leu Lys Ser Trp His Arg Leu Lys Asn Lys Arg Asp Leu Asn Ser
                325                 330                 335
```

<210> 9
<211> 357
<212> PRT
<213> Caenorhabditis elegans

<400> 9

```
Ile Ala Gly Ser Val Glu Lys Phe Val Asn Ser Ile Thr Lys Lys Ser
1               5                   10                  15

Phe Asn Ser Val Lys Gln Leu Ser Lys Leu Ala Trp Asp His Tyr Leu
            20                  25                  30

Gly Asn Ala Gln Pro Asp Phe Val Phe Leu Lys Lys Met Glu Ala Arg
        35                  40                  45

Gln Lys Leu Phe Ser Glu Ile Lys Lys Leu Phe Pro Asp Thr Glu Ile
    50                  55                  60

Lys Leu Gln Thr Thr Gly Ser Thr Val Asn Gly Cys Gly Ser Phe Asn
65                  70                  75                  80

Ser Asp Met Asp Leu Cys Leu Cys Phe Pro Thr Asn Gly Tyr Lys Gly
                85                  90                  95

Gln Val Cys Asp Asp Phe His Cys Asp Arg Asn Tyr Ser Thr Lys Ile
            100                 105                 110

Leu Arg Lys Ile Asp Lys Ala Phe Arg Arg Ser His Trp Ser His Pro
        115                 120                 125

Leu Lys Lys Ile Ile Lys Thr Met Gln Leu Val Pro Ala Lys Val Pro
    130                 135                 140

Ile Val Lys Met Ile Leu Asn Gly Glu Phe Asp Gly Ile Glu Val Asp
145                 150                 155                 160

Ile Asn Val Asn Asn Ile Ala Gly Ile Tyr Asn Ser His Leu Ile His
                165                 170                 175

Tyr Tyr Ser Leu Thr Asp Ala Arg Leu Pro Ala Leu Ala Leu Leu Val
            180                 185                 190
```

```
Lys His Trp Ala Met Val Thr Gly Ile Asn Asn Ala Gln Asp Gly Phe
        195                 200                 205

Leu Asn Ser Tyr Thr Thr Ile Leu Leu Val Val His Tyr Leu Gln Cys
    210                 215                 220

Gly Val Thr Pro Ala Val Ile Pro Asn Leu Gln Tyr Leu Phe Pro His
225                 230                 235                 240

Lys Phe Asp Arg Lys Leu Pro Leu Asn Glu Leu Leu Leu Phe Gly Asp
                245                 250                 255

Ile Ala Asp Lys Leu Pro Thr Ser Pro Pro Asn Thr Trp Ser Leu Gly
            260                 265                 270

Glu Leu Leu Ile Gly Phe Phe Gln Tyr Tyr Asn Glu Phe Asp Phe Thr
        275                 280                 285

Asn Phe Gly Phe Ser Ile Arg Ser Gly Gln Val Ile Pro Arg Glu Asn
    290                 295                 300

Leu Pro Arg Asp Leu Ile Asn Ser Pro Ile Val Val Glu Glu Pro Phe
305                 310                 315                 320

Asp Ala Ile Asn Thr Ala Arg Thr Val Arg Asp Val Ser His Met Lys
                325                 330                 335

Ser Ile Lys Ser Ala Phe Arg Cys Ala Val Gln Ile Ile Ser Ser Asn
            340                 345                 350

Lys Asn Phe Thr Met
        355
```

<210> 10
<211> 332
<212> PRT
<213> Arabidopsis thaliana

<400> 10

```
Gln Lys Ala Arg Met Val Lys Met Tyr Met Ala Cys Arg Asn Asp Ile
1               5                   10                  15

His Arg Tyr Asp Ala Thr Phe Ile Ala Ile Tyr Lys Ser Leu Ile Pro
            20                  25                  30
```

```
Ala Glu Glu Glu Leu Glu Lys Gln Arg Gln Leu Met Ala His Leu Glu
        35                  40                  45

Asn Leu Val Ala Lys Glu Trp Pro His Ala Lys Leu Tyr Leu Tyr Gly
    50                  55                  60

Ser Cys Ala Asn Ser Phe Gly Phe Pro Lys Ser Asp Ile Asp Val Cys
65                  70                  75                  80

Leu Ala Ile Glu Gly Asp Asp Ile Asn Lys Ser Glu Met Leu Leu Lys
                85                  90                  95

Leu Ala Glu Ile Leu Glu Ser Asp Asn Leu Gln Asn Val Gln Ala Leu
            100                 105                 110

Thr Arg Ala Arg Val Pro Ile Val Lys Leu Met Asp Pro Val Thr Gly
        115                 120                 125

Ile Ser Cys Asp Ile Cys Ile Asn Asn Val Leu Ala Val Val Asn Thr
    130                 135                 140

Lys Leu Leu Arg Asp Tyr Ala Gln Ile Asp Val Arg Leu Arg Gln Leu
145                 150                 155                 160

Ala Phe Ile Val Lys His Trp Ala Lys Ser Arg Arg Val Asn Glu Thr
                165                 170                 175

Tyr Gln Gly Thr Leu Ser Ser Tyr Ala Tyr Val Leu Met Cys Ile His
            180                 185                 190

Phe Leu Gln Gln Arg Arg Pro Pro Ile Leu Pro Cys Leu Gln Glu Met
        195                 200                 205

Glu Pro Thr Tyr Ser Val Arg Val Asp Asn Ile Arg Cys Thr Tyr Phe
    210                 215                 220

Asp Asn Val Asp Arg Leu Arg Asn Phe Gly Ser Asn Asn Arg Glu Thr
225                 230                 235                 240

Ile Ala Glu Leu Val Trp Gly Phe Phe Asn Tyr Trp Ala Tyr Ala His
                245                 250                 255

Asp Tyr Ala Tyr Asn Val Val Ser Val Arg Thr Gly Ser Ile Leu Gly
            260                 265                 270
```

Lys Arg Glu Lys Asp Trp Thr Arg Arg Val Gly Asn Asp Arg His Leu
275 280 285

Ile Cys Ile Glu Asp Pro Phe Glu Thr Ser His Asp Leu Gly Arg Val
290 295 300

Val Asp Lys Phe Ser Ile Arg Val Leu Arg Glu Glu Phe Glu Arg Ala
305 310 315 320

Ala Arg Ile Met His Gln Asp Pro Asn Pro Cys Ala
325 330

<210> 11
<211> 349
<212> PRT
<213> Homo sapiens

<400> 11

Pro Glu Asp Phe Lys Arg Ile Gln Leu Glu Pro Leu Pro Pro Leu Thr
1 5 10 15

Pro Lys Phe Leu Asn Ile Leu Asp Gln Val Cys Ile Gln Cys Tyr Lys
20 25 30

Asp Phe Ser Pro Thr Ile Ile Glu Asp Gln Ala Arg Glu His Ile Arg
35 40 45

Gln Asn Leu Glu Ser Phe Ile Arg Gln Asp Phe Pro Gly Thr Lys Leu
50 55 60

Ser Leu Phe Gly Ser Ser Lys Asn Gly Phe Gly Phe Lys Gln Ser Asp
65 70 75 80

Leu Asp Val Cys Met Thr Ile Asn Gly Leu Glu Thr Ala Glu Gly Leu
85 90 95

Asp Cys Val Arg Thr Ile Glu Glu Leu Ala Arg Val Leu Arg Lys His
100 105 110

Ser Gly Leu Arg Asn Ile Leu Pro Ile Thr Thr Ala Lys Val Pro Ile
115 120 125

Val Lys Phe Phe His Leu Arg Ser Gly Leu Glu Val Asp Ile Ser Leu
130 135 140

Tyr Asn Thr Leu Ala Leu His Asn Thr Arg Leu Leu Ser Ala Tyr Ser
145 150 155 160

```
Ala Ile Asp Pro Arg Val Lys Tyr Leu Cys Tyr Thr Met Lys Val Phe
                165                 170                 175

Thr Lys Met Cys Asp Ile Gly Asp Ala Ser Arg Gly Ser Leu Ser Ser
            180                 185                 190

Tyr Ala Tyr Thr Leu Met Val Leu Tyr Phe Leu Gln Gln Arg Asn Pro
        195                 200                 205

Pro Val Ile Pro Val Leu Gln Glu Ile Tyr Lys Gly Glu Lys Lys Pro
    210                 215                 220

Glu Ile Phe Val Asp Gly Trp Asn Ile Tyr Phe Phe Asp Gln Ile Asp
225                 230                 235                 240

Glu Leu Pro Thr Tyr Trp Ser Glu Cys Gly Lys Asn Thr Glu Ser Val
                245                 250                 255

Gly Gln Leu Trp Leu Gly Leu Leu Arg Phe Tyr Thr Glu Glu Phe Asp
            260                 265                 270

Phe Lys Glu His Val Ile Ser Ile Arg Arg Lys Ser Leu Leu Thr Thr
        275                 280                 285

Phe Lys Lys Gln Trp Thr Ser Lys Tyr Ile Val Ile Glu Asp Pro Phe
    290                 295                 300

Asp Leu Asn His Asn Leu Gly Ala Gly Leu Ser Arg Lys Met Thr Asn
305                 310                 315                 320

Phe Ile Met Lys Ala Phe Ile Asn Gly Arg Arg Val Phe Gly Ile Pro
                325                 330                 335

Val Lys Gly Phe Pro Lys Asp Tyr Pro Ser Lys Met Glu
            340                 345
```

<210> 12
<211> 345
<212> PRT
<213> Bos taurus

<400> 12

```
Tyr Gly Ile Thr Ser Pro Ile Ser Leu Ala Ala Pro Lys Glu Thr Asp
1               5                   10                  15
```

```
Cys Leu Leu Thr Gln Lys Leu Val Glu Thr Leu Lys Pro Phe Gly Val
            20                  25                  30

Phe Glu Glu Glu Glu Glu Leu Gln Arg Arg Ile Leu Ile Leu Gly Lys
        35                  40                  45

Leu Asn Asn Leu Val Lys Glu Trp Ile Arg Glu Ile Ser Glu Ser Lys
    50                  55                  60

Asn Leu Pro Gln Ser Val Ile Glu Asn Val Gly Gly Lys Ile Phe Thr
65                  70                  75                  80

Phe Gly Ser Tyr Arg Leu Gly Val His Thr Lys Gly Ala Asp Ile Asp
                85                  90                  95

Ala Leu Cys Val Ala Pro Arg His Val Asp Arg Ser Asp Phe Phe Thr
            100                 105                 110

Ser Phe Tyr Asp Lys Leu Lys Leu Gln Glu Glu Val Lys Asp Leu Arg
        115                 120                 125

Ala Val Glu Glu Ala Phe Val Pro Val Ile Lys Leu Cys Phe Asp Gly
    130                 135                 140

Ile Glu Ile Asp Ile Leu Phe Ala Arg Leu Ala Leu Gln Thr Ile Pro
145                 150                 155                 160

Glu Asp Leu Asp Leu Arg Asp Asp Ser Leu Leu Lys Asn Leu Asp Ile
                165                 170                 175

Arg Cys Ile Arg Ser Leu Asn Gly Cys Arg Val Thr Asp Glu Ile Leu
            180                 185                 190

His Leu Val Pro Asn Ile Asp Asn Phe Arg Leu Thr Leu Arg Ala Ile
        195                 200                 205

Lys Leu Trp Ala Lys Arg His Asn Ile Tyr Ser Asn Ile Leu Gly Phe
    210                 215                 220

Leu Gly Gly Val Ser Trp Ala Met Leu Val Ala Arg Thr Cys Gln Leu
225                 230                 235                 240

Tyr Pro Asn Ala Ile Ala Ser Thr Leu Val His Lys Phe Phe Leu Val
                245                 250                 255
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Phe Ser Lys Trp Glu Trp Pro Asn Pro Val Leu Leu Lys Gln Pro Glu
            260                 265                 270

Glu Cys Asn Leu Asn Leu Pro Val Trp Asp Pro Arg Val Asn Pro Ser
        275                 280                 285

Asp Arg Tyr His Leu Met Pro Ile Ile Thr Pro Ala Tyr Pro Gln Gln
    290                 295                 300

Asn Ser Thr Tyr Asn Val Ser Val Ser Thr Arg Met Val Met Val Glu
305                 310                 315                 320

Glu Phe Lys Gln Gly Leu Ala Ile Thr Asp Glu Ile Leu Leu Ser Lys
                325                 330                 335

Ala Glu Trp Ser Lys Leu Phe Glu Ala
            340                 345
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